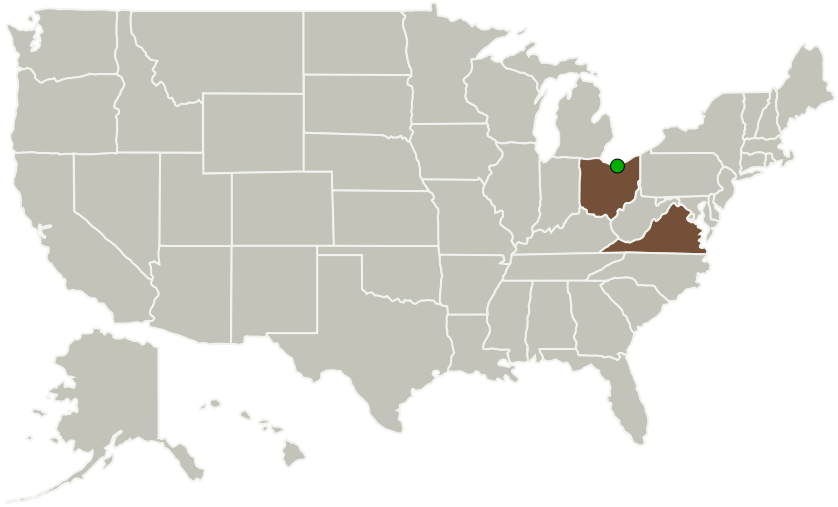
Thin-Film Hybrid Coating for Ice Mitigation on Aircraft, Phase I

Completed Technology Project (2016 - 2016)

Project Introduction

Current aircraft utilize electro-thermal/mechanical protection systems to actively remove ice from vital aircraft surfaces. These systems have high power requirements and only protect certain areas of the aircraft; thus such technology is not considered for next generation vehicles as it will greatly diminish the allocation of power for other vital components. The accumulation of ice on an aircraft (airframe or engine components) results in a drastic decrease of performance (decrease in thrust and lift, increase in weight and drag). To this effect, Materials Modification, Inc. (MMI), proposes to develop a thin-film coating that will combat dynamic icing conditions with a two-part solution; in which the top layer coating consists of a smooth superhydrophobic coating to combat the supercooled water droplets and a base layer that consists of a smooth silicone elastomer to reduce ice adhesion strength from possible ice nucleation. Phase I efforts will be primarily dedicated towards developing and synthesizing the hybrid thin-film coating and evaluating its ice adhesion strength, coating durability, and surface morphology. Phase II efforts will build upon the results of the Phase I findings and incorporate the material/coating into NASA's constructed vehicles such as UAVs, manned aircrafts, and next generation aerial vehicles (N+2).

Primary U.S. Work Locations and Key Partners



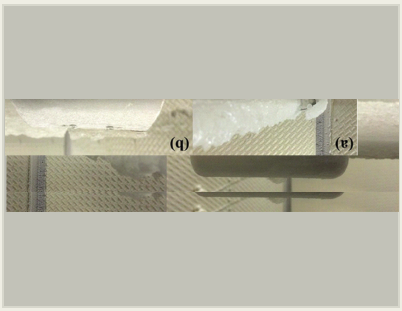


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Thin-Film Hybrid Coating for Ice Mitigation on Aircraft, Phase I

Completed Technology Project (2016 - 2016)

Organizations Performing Work	Role	Type	Location
Materials Modification, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Fairfax, Virginia
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

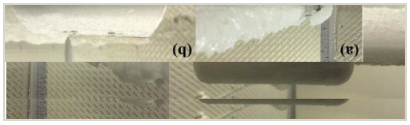
June 2016: Project Start

December 2016: Closed out

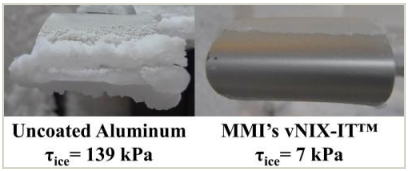
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139499)*

Images



Briefing Chart Image
Thin-film Hybrid Coating for Ice Mitigation on Aircraft, Phase I
(https://techport.nasa.gov/image/132528)



Final Summary Chart Image
Thin-film Hybrid Coating for Ice Mitigation on Aircraft, Phase I Project Image
(https://techport.nasa.gov/image/135667)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Materials Modification, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

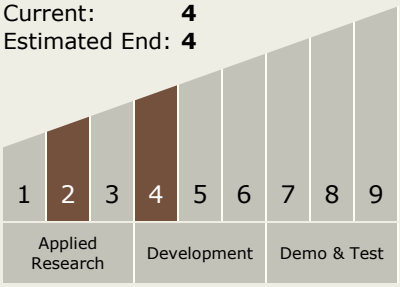
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Tirumalai S Sudarshan

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Thin-Film Hybrid Coating for Ice Mitigation on Aircraft, Phase I

Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.9 Hybrid Electric Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System